



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 27, 2014 – 04:43 PM GMT

PDB ID : 3WC1
Title : Crystal structure of *C. albicans* tRNA(His) guanylyltransferase (Thg1) with a G-1 deleted tRNA(His)
Authors : Nakamura, A.; Nemoto, T.; Sonoda, T.; Yamashita, K.; Tanaka, I.; Yao, M.
Deposited on : 2013-05-24
Resolution : 4.18 Å(reported)

This is a full wwPDB validation report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

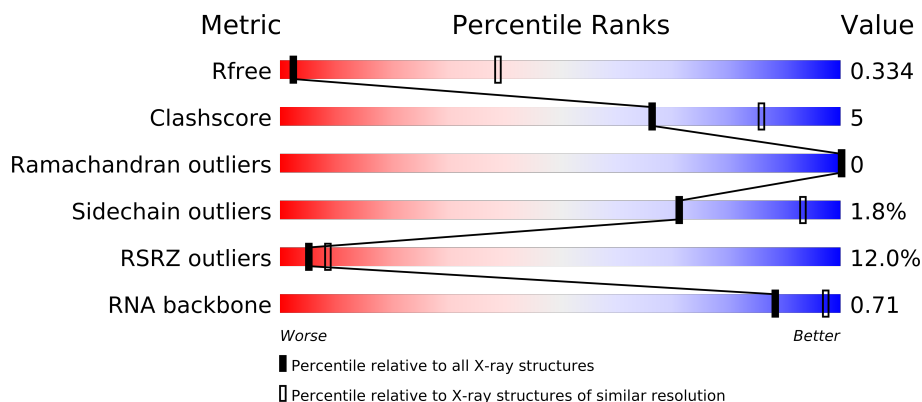
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 4.18 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	66092	1001 (4.84-3.50)
Clashscore	79885	1259 (4.84-3.50)
Ramachandran outliers	78287	1192 (4.84-3.50)
Sidechain outliers	78261	1175 (4.84-3.50)
RSRZ outliers	66119	1001 (4.84-3.50)
RNA backbone	1838	1026 (5.50-2.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	271	
1	B	271	
1	C	271	
1	D	271	
2	P	75	
2	Q	75	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 11230 atoms, of which 0 are hydrogen and 0 are deuterium.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Likely histidyl tRNA-specific guanylyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	238	Total	C	N	O	S	0	0	0
			2032	1320	331	369	12			
1	B	238	Total	C	N	O	S	0	0	0
			2032	1320	331	369	12			
1	C	238	Total	C	N	O	S	0	0	0
			2032	1320	331	369	12			
1	D	238	Total	C	N	O	S	0	0	0
			2032	1320	331	369	12			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	EXPRESSION TAG	UNP Q5AFK5
A	-1	GLY	-	EXPRESSION TAG	UNP Q5AFK5
A	0	SER	-	EXPRESSION TAG	UNP Q5AFK5
B	-2	GLY	-	EXPRESSION TAG	UNP Q5AFK5
B	-1	GLY	-	EXPRESSION TAG	UNP Q5AFK5
B	0	SER	-	EXPRESSION TAG	UNP Q5AFK5
C	-2	GLY	-	EXPRESSION TAG	UNP Q5AFK5
C	-1	GLY	-	EXPRESSION TAG	UNP Q5AFK5
C	0	SER	-	EXPRESSION TAG	UNP Q5AFK5
D	-2	GLY	-	EXPRESSION TAG	UNP Q5AFK5
D	-1	GLY	-	EXPRESSION TAG	UNP Q5AFK5
D	0	SER	-	EXPRESSION TAG	UNP Q5AFK5

- Molecule 2 is a RNA chain called 75-mer tRNA.

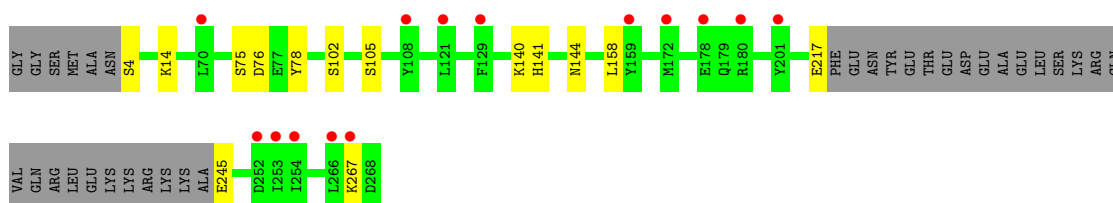
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	P	73	Total	C	N	O	P	0	0	0
			1551	693	268	517	73			
2	Q	73	Total	C	N	O	P	0	0	0
			1551	693	268	517	73			

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

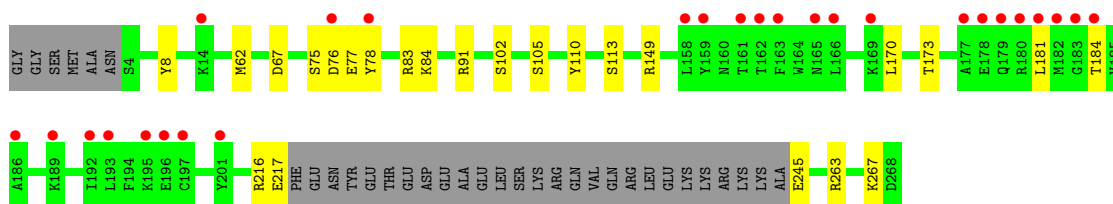
- Molecule 1: Likely histidyl tRNA-specific guanylyltransferase

Chain A: 



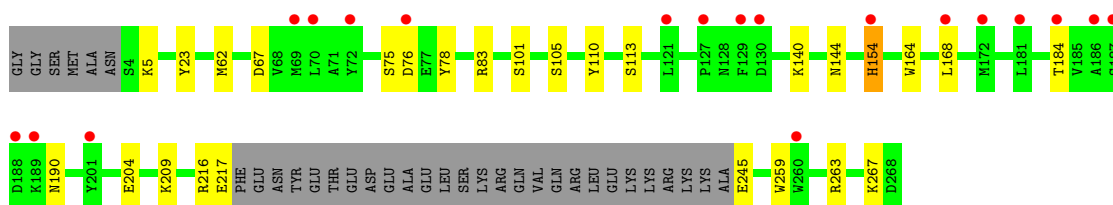
- Molecule 1: Likely histidyl tRNA-specific guanylyltransferase

Chain B: 



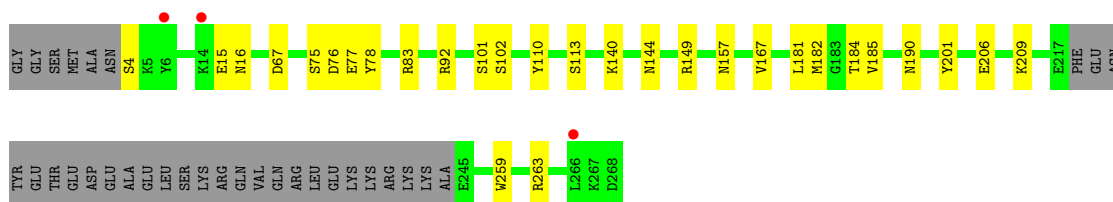
- Molecule 1: Likely histidyl tRNA-specific guanylyltransferase

Chain C: 

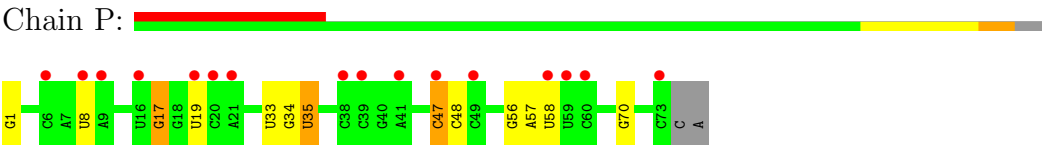


- Molecule 1: Likely histidyl tRNA-specific guanylyltransferase

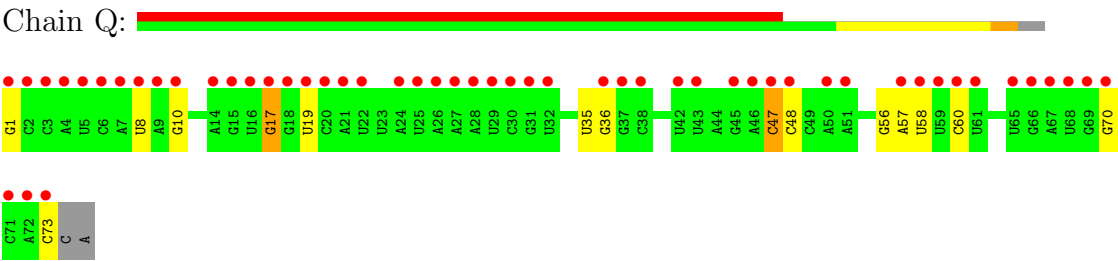
Chain D: 



● Molecule 2: 75-mer tRNA



● Molecule 2: 75-mer tRNA



4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	96.53Å 96.53Å 300.39Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	42.95 – 4.18 48.79 – 4.18	Depositor EDS
% Data completeness (in resolution range)	98.8 (42.95-4.18) 98.9 (48.79-4.18)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.77 (at 4.14Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, R_{free}	0.292 , 0.335 0.293 , 0.334	Depositor DCC
R_{free} test set	875 reflections (6.99%)	DCC
Wilson B-factor (Å ²)	174.3	Xtriage
Anisotropy	0.369	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 92.0	EDS
Estimated twinning fraction	0.059 for -h,-k,l	Xtriage
L-test for twinning	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.27$	Xtriage
Outliers	0 of 12539 reflections	Xtriage
F_o, F_c correlation	0.83	EDS
Total number of atoms	11230	wwPDB-VP
Average B, all atoms (Å ²)	135.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.31% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality

5.1 Standard geometry

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.25	0/2089	0.43	0/2819
1	B	0.25	0/2089	0.43	0/2819
1	C	0.25	0/2089	0.47	0/2819
1	D	0.26	0/2089	0.44	0/2819
2	P	0.39	1/1732 (0.1%)	0.81	0/2694
2	Q	0.40	1/1732 (0.1%)	0.84	0/2694
All	All	0.30	2/11820 (0.0%)	0.59	0/16664

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	Q	1	G	OP3-P	-10.60	1.48	1.61
2	P	1	G	OP3-P	-10.35	1.48	1.61

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2032	0	0	8	0
1	B	2032	0	0	12	0
1	C	2032	0	0	13	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2032	0	0	16	0
2	P	1551	0	0	5	0
2	Q	1551	0	0	6	0
All	All	11230	0	0	50	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 5.

All (50) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:C:204:GLU:O	1:C:209:LYS:NZ	2.23	0.71
1:C:140:LYS:O	1:C:144:ASN:ND2	2.26	0.68
1:A:140:LYS:O	1:A:144:ASN:ND2	2.28	0.67
1:B:217:GLU:OE2	1:B:263:ARG:NH1	2.27	0.67
1:D:259:TRP:O	1:D:263:ARG:NH1	2.28	0.66
1:D:15:GLU:OE2	1:D:92:ARG:NH1	2.30	0.64
1:D:140:LYS:O	1:D:144:ASN:ND2	2.32	0.62
1:B:67:ASP:OD1	1:B:83:ARG:NH1	2.34	0.61
1:D:190:ASN:OD1	2:P:35:U:N3	2.34	0.60
1:C:67:ASP:OD1	1:C:83:ARG:NH1	2.34	0.60
1:C:259:TRP:O	1:C:263:ARG:NH1	2.37	0.57
1:A:14:LYS:NZ	1:D:16:ASN:OD1	2.38	0.57
1:D:4:SER:N	2:Q:10:G:O2'	2.38	0.56
1:D:110:TYR:O	1:D:113:SER:OG	2.26	0.54
1:C:217:GLU:N	1:C:245:GLU:O	2.40	0.53
1:B:84:LYS:O	1:B:91:ARG:NH2	2.44	0.51
1:B:110:TYR:O	1:B:113:SER:OG	2.29	0.50
2:P:17:G:O2'	2:P:56:G:N1	2.45	0.50
1:B:217:GLU:N	1:B:245:GLU:O	2.45	0.50
1:B:75:SER:OG	1:B:76:ASP:N	2.45	0.49
1:D:206:GLU:OE2	1:D:209:LYS:NZ	2.45	0.49
1:C:110:TYR:O	1:C:113:SER:OG	2.31	0.49
1:C:62:MET:O	1:C:216:ARG:NH2	2.46	0.48
1:A:105:SER:OG	1:B:102:SER:OG	2.31	0.48
2:P:8:U:O4'	2:P:47:C:O2'	2.31	0.48
1:D:77:GLU:OE1	1:D:149:ARG:NH2	2.47	0.48
1:A:141:HIS:ND1	1:B:8:TYR:OH	2.47	0.48
2:P:33:U:O2'	2:P:34:G:O5'	2.32	0.47
1:C:75:SER:OG	1:C:76:ASP:N	2.48	0.46
1:A:75:SER:OG	1:A:76:ASP:N	2.47	0.46
1:A:102:SER:OG	1:B:105:SER:OG	2.34	0.46
1:D:157:ASN:ND2	1:D:201:TYR:OH	2.50	0.45

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:D:75:SER:OG	1:D:76:ASP:N	2.50	0.45
1:D:67:ASP:OD1	1:D:83:ARG:NH2	2.50	0.45
1:C:101:SER:OG	1:D:101:SER:OG	2.34	0.45
2:Q:8:U:O4'	2:Q:47:C:O2'	2.35	0.45
1:C:105:SER:OG	1:D:102:SER:OG	2.34	0.45
2:Q:57:A:N6	2:Q:60:C:C2	2.86	0.44
1:A:217:GLU:N	1:A:245:GLU:O	2.51	0.44
1:A:4:SER:N	2:Q:73:C:O2	2.50	0.44
1:C:164:TRP:O	1:C:168:LEU:N	2.50	0.44
1:B:62:MET:O	1:B:216:ARG:NH2	2.51	0.43
1:D:181:LEU:O	1:D:184:THR:OG1	2.36	0.42
1:C:23:TYR:OH	1:C:267:LYS:O	2.36	0.42
1:D:77:GLU:OE2	1:D:149:ARG:NE	2.52	0.42
2:Q:17:G:O2'	2:Q:56:G:N2	2.53	0.41
1:C:154:HIS:CE1	2:Q:36:G:N1	2.88	0.41
1:B:181:LEU:O	1:B:184:THR:OG1	2.39	0.41
1:B:77:GLU:OE1	1:B:149:ARG:NH1	2.53	0.41
2:P:17:G:C5	2:P:57:A:C6	3.09	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution. The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	234/271 (86%)	232 (99%)	2 (1%)	0	100	100
1	B	234/271 (86%)	234 (100%)	0	0	100	100
1	C	234/271 (86%)	234 (100%)	0	0	100	100
1	D	234/271 (86%)	234 (100%)	0	0	100	100
All	All	936/1084 (86%)	934 (100%)	2 (0%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution. The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	224/252 (89%)	221 (99%)	3 (1%)	80	95
1	B	224/252 (89%)	220 (98%)	4 (2%)	71	93
1	C	224/252 (89%)	219 (98%)	5 (2%)	64	91
1	D	224/252 (89%)	220 (98%)	4 (2%)	71	93
All	All	896/1008 (89%)	880 (98%)	16 (2%)	71	93

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	78	TYR
1	A	158	LEU
1	A	267	LYS
1	B	78	TYR
1	B	170	LEU
1	B	173	THR
1	B	267	LYS
1	C	5	LYS
1	C	78	TYR
1	C	154	HIS
1	C	184	THR
1	C	190	ASN
1	D	78	TYR
1	D	167	VAL
1	D	182	MET
1	D	185	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	P	72/75 (96%)	7 (9%)	0

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	Q	72/75 (96%)	7 (9%)	0
All	All	144/150 (96%)	14 (9%)	0

All (14) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	P	17	G
2	P	19	U
2	P	35	U
2	P	47	C
2	P	48	C
2	P	58	U
2	P	70	G
2	Q	17	G
2	Q	19	U
2	Q	35	U
2	Q	47	C
2	Q	48	C
2	Q	58	U
2	Q	70	G

There are no RNA pucker outliers to report.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	238/271 (87%)	0.58	14 (5%) 22 21	78, 118, 148, 157	0
1	B	238/271 (87%)	0.91	27 (11%) 6 9	27, 140, 274, 298	0
1	C	238/271 (87%)	0.69	19 (7%) 12 15	17, 130, 235, 262	0
1	D	238/271 (87%)	0.40	3 (1%) 74 59	16, 69, 106, 132	0
2	P	73/75 (97%)	1.12	16 (21%) 1 3	96, 104, 110, 111	0
2	Q	73/75 (97%)	3.91	53 (72%) 0 1	255, 262, 270, 272	0
All	All	1098/1234 (88%)	0.89	132 (12%) 5 8	16, 111, 264, 298	0

All (132) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	182	MET	16.0
2	Q	26	A	15.2
1	B	180	ARG	14.1
1	B	181	LEU	12.7
2	Q	59	U	9.4
2	Q	25	U	9.1
2	Q	6	C	8.8
2	Q	7	A	8.2
2	Q	58	U	8.1
2	Q	1	G	8.1
2	Q	20	C	8.0
2	Q	36	G	7.7
2	Q	19	U	7.6
2	Q	66	G	7.0
1	B	184	THR	6.2
2	Q	30	C	6.2
1	C	172	MET	6.2
1	A	201	TYR	6.1
1	C	186	ALA	6.1

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Mol	Chain	Res	Type	RSRZ
2	Q	57	A	6.1
2	Q	47	C	6.0
2	Q	48	C	5.7
1	B	183	GLY	5.7
1	B	162	THR	5.6
2	Q	29	U	5.6
2	Q	27	A	5.5
1	C	201	TYR	5.5
1	A	121	LEU	5.4
2	Q	21	A	5.3
2	Q	60	C	5.0
1	B	178	GLU	4.9
2	Q	15	G	4.9
1	B	189	LYS	4.8
2	Q	8	U	4.8
2	Q	67	A	4.7
2	Q	31	G	4.6
2	Q	72	A	4.5
2	P	58	U	4.5
2	Q	9	A	4.5
2	Q	24	A	4.4
1	B	159	TYR	4.3
1	B	158	LEU	4.3
2	Q	28	A	4.2
2	Q	51	A	4.1
1	B	179	GLN	4.0
2	Q	43	U	4.0
1	C	127	PRO	4.0
2	P	59	U	4.0
2	Q	5	U	3.9
2	Q	2	C	3.9
2	Q	50	A	3.8
1	C	188	ASP	3.8
2	Q	69	G	3.8
1	B	196	GLU	3.8
1	B	195	LYS	3.8
2	Q	10	G	3.7
2	Q	42	U	3.7
1	B	163	PHE	3.6
2	Q	16	U	3.5
2	Q	71	C	3.5
2	Q	65	U	3.5

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Mol	Chain	Res	Type	RSRZ
1	A	159	TYR	3.4
2	Q	70	G	3.4
1	B	192	ILE	3.4
2	Q	46	A	3.3
2	Q	68	U	3.3
2	Q	18	G	3.3
2	Q	37	G	3.3
2	P	41	A	3.3
2	P	73	C	3.2
2	Q	73	C	3.2
2	Q	38	C	3.1
2	Q	3	C	3.1
2	Q	32	U	3.0
2	Q	14	A	3.0
1	C	154	HIS	3.0
2	Q	45	G	2.9
2	P	9	A	2.9
1	C	70	LEU	2.9
1	D	14	LYS	2.8
2	P	19	U	2.8
1	A	180	ARG	2.8
1	A	252	ASP	2.7
2	P	20	C	2.7
1	B	169	LYS	2.7
1	B	193	LEU	2.7
1	C	129	PHE	2.7
2	P	16	U	2.6
2	P	8	U	2.6
2	P	6	C	2.6
1	C	189	LYS	2.6
1	B	165	ASN	2.6
1	A	267	LYS	2.5
1	A	178	GLU	2.5
2	P	60	C	2.5
1	C	168	LEU	2.5
1	C	121	LEU	2.5
1	C	76	ASP	2.5
1	B	186	ALA	2.5
1	B	201	TYR	2.4
2	P	38	C	2.4
1	D	6	TYR	2.4
1	A	129	PHE	2.4

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Mol	Chain	Res	Type	RSRZ
1	C	72	TYR	2.4
1	A	253	ILE	2.3
1	C	130	ASP	2.3
1	B	76	ASP	2.3
1	A	108	TYR	2.2
1	A	172	MET	2.2
1	C	260	TRP	2.2
1	A	254	ILE	2.2
2	Q	61	U	2.2
1	C	69	MET	2.2
1	B	197	CYS	2.2
1	B	14	LYS	2.2
2	P	47	C	2.2
1	C	187	SER	2.2
2	Q	22	U	2.2
1	C	181	LEU	2.2
1	C	184	THR	2.1
1	B	161	THR	2.1
1	B	78	TYR	2.1
1	A	70	LEU	2.1
1	B	166	LEU	2.1
1	D	266	LEU	2.1
2	P	49	C	2.1
2	P	21	A	2.1
2	Q	17	G	2.1
2	P	39	C	2.1
2	Q	4	A	2.0
1	B	177	ALA	2.0
1	A	266	LEU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.